5^{th} International Mathematics Assessments for Schools (2015-2016)

Upper Primary Division Round 2

Time: 120 minutes

Printed Name: ____________ *Code*: ________ *Score*: ________

Instructions:

- Do not open the contest booklet until you are told to do so.
- Be sure that your name and code are written on the space provided above.
- Round 2 of IMAS is composed of three parts; the total score is 100 marks.
- Questions 1 to 5 are given as a multiple-choice test. Each question has five possible options marked as A, B, C, D and E. Only one of these options is correct. After making your choice, fill in the appropriate letter in the space provided. Each correct answer is worth 4 marks. There is no penalty for an incorrect answer.
- Questions 6 to 13 are a short answer test. Only Arabic numerals are accepted; using other written text will not be honored or credited. Some questions have more than one answer, as such all answers are required to be written down in the space provided to obtain full marks. Each correct answer is worth 5 marks. There is no penalty for incorrect answers.
- Questions 14 and 15 require a detailed solution or process in which 20 marks are to be awarded to a completely written solution. Partial marks may be given to an incomplete presentation. There is no penalty for an incorrect answer.
- Use of electronic computing devices is not allowed.
- Only pencil, blue or black ball-pens may be used to write your solution or answer.
- Diagrams are not drawn to scale. They are intended as aids only.
- After the contest the invigilator will collect the contest paper.

The following area is to be filled in by the judges;
the contestants are not supposed to mark anything here.

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total Score	Signature
Score																	
Score																	

Upper Primary Division Round 2

Questions 1 to 5, 4 marks each

1. What is the value of $666+669+699+999$?

（A）2433　　（B）2970　　（C）2973　　（D）3030　　（E）3033

Answer：____________

2. The positive integers a, b, c and d are such that

$$\frac{1}{a-2013}=\frac{1}{b+2014}=\frac{1}{c-2015}=\frac{1}{d+2016}.$$

Which of the following orderings of these four numbers is correct?

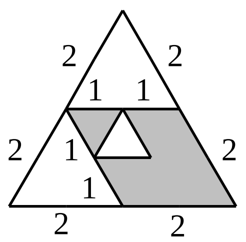
（A）$b<d<a<c$　　（B）$d<b<a<c$　　（C）$d<a<b<c$

（D）$d<b<c<a$　　（E）$b<d<c<a$

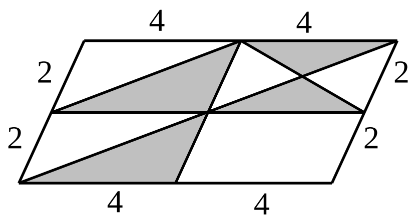
Answer：____________

3. In which of the following diagrams is the total area of the shaded parts equal to the total area of the unshaded parts?

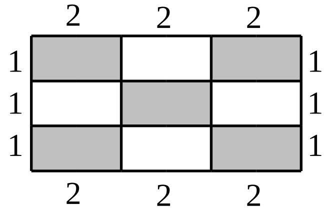
（A）



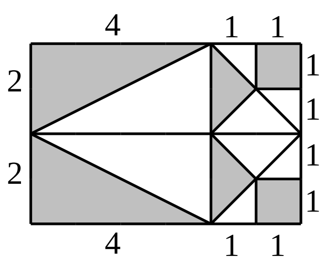
（B）



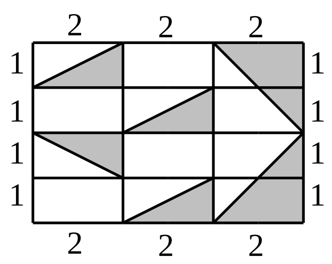
（C）



（D）

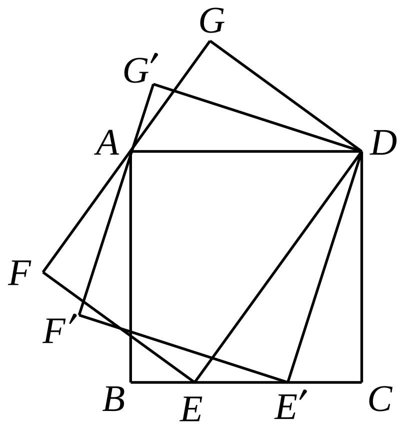


（E）



Answer：____________

4. E is a variable point on the side BC of a square $ABCD$. $DEFG$ is a rectangle with FG passing through A. As the point E moves from B towards C, how does the area of $DEFG$ change?



（A）Remaining constant
（B）Steadily increasing （C）Steadily decreasing
（D）Increasing and then decreasing （E）Decreasing and then increasing

Answer：____________

5. Jerry and George are jogging along a circular path. If Jerry runs another 400 m, he will have completed 2 laps. If George runs another 500 m, he will have completed 3 laps. The total distance they have covered is 100 m more than 4 laps. What is the length, in m, of 1 lap?
（A）1000 （B）900 （C）800 （D）750 （E）700

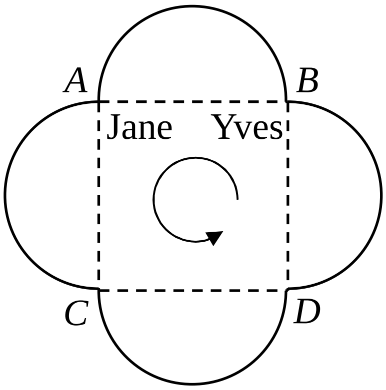
Answer：____________

Questions 6 to 13, 5 marks each

6. A worker makes 6000 dollars in basic wages plus overtime payment. His overtime payment is two-thirds of his basic wage. How much, in dollars, is his basic wage?

Answer：$ ____________

7. The diagram shows a path consisting of four semi-circular arcs. Each arc is of length 100 m and uses a different side of a square as its diameter. Initially, Jane is at *A* and Yves at *B*. They start walking counter-clockwise at the same time. Jane's speed is 120 m per minute and Yves's is 150 m per minute. Each pauses for 1 second whenever they are at the points *A*, *B*, *C* or *D*. How many seconds after starting will Yves overtake for the first time with Jane?



Answer： ________ seconds

8. There are three kinds of bottles, holding 0.4 L, 0.6 L and 1 L respectively. The total capacity of several bottles, at least one each kind, is 18 L. How many possible values of the number of bottles holding 0.6 L are there if there is at least one bottle of each kind?

Answer： ________ cm^2

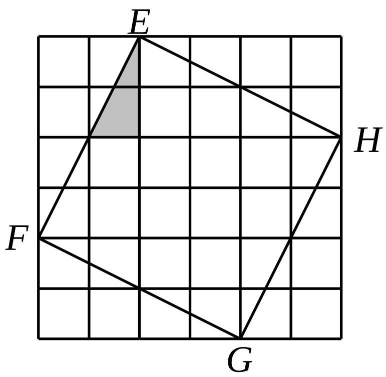
9. Marion chooses three different non-zero digits and form all possible three-digit numbers with them. If m is the sum of these numbers and n is the sum of the digit-sums of these numbers, what is the value of $\frac{m}{n}$?

Answer： ________ expressions

10. How many of the integers from 100 to 999 inclusive have the property that the sum of the units digit and the hundreds digit is equal to the tens digit?

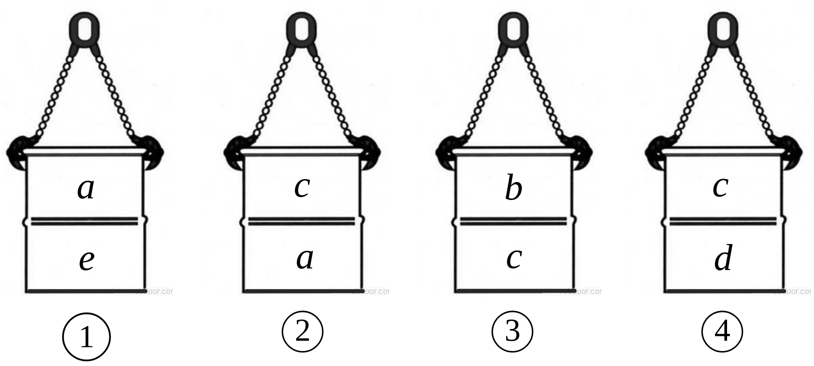
Answer：

11. The diagram shows a shaded triangle in a 6 by 6 board. How many triangles are there such that their edges are all grid lines of the board or the edges of *EFGH*, and their angles are equal respectively to the angles of the shaded triangle? You should also count the shaded triangle.



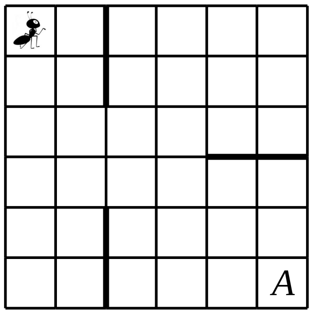
Answer：

12. There are 26 toys be distributed into five boxes, with a, b, c, d and e toys in them respectively, where a, b, c, d and e are positive integers. The diagram shows four combinations of two boxes at a time. The total number of toys in the two boxes exceeds 11 in all but the second case. How many different distributions are there?



Answer：

13. The diagram shows a 6 by 6 board with three barriers. An ant is at the top left corner and wishes to reach the bottom right corner. It may only crawl between squares which share a common side, and only towards the bottom or the right, It cannot pass through any barrier. How many different paths can it follow?



Answer： ________ paths

Questions 14 to 15, 20 marks each
(Detailed solutions are needed for these two problems)

14. What is the largest integer n such that there is a multiple of 4 than greater n^2 but less than $n^2+\dfrac{2016}{n^2}$?

Answer： ____________

15. Each of the integers from 1 to 16 inclusive is put in a different square of a 4 by 4 table. For any two squares sharing a common side, the sum of the numbers in them is recorded. What is the maximum value of the smallest one among the recorded numbers?

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Answer：______________